Introductions for Biological Control in Hawaii: 1983 and 1984

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The Plant Pest Control Branch of the Hawaii Department of Agriculture has maintained a beneficial organism introduction program for many years. This paper provides notes on the status of some pests and their purposely introduced natural enemies and a list of beneficial organisms introduced and released for biological control during 1983 and 1984 (Table 1). All beneficial introductions are thoroughly screened and studied in a quarantine facility and must be approved by the Board of Agriculture prior to being released in Hawaii.

INSECT PEST CONTROL

Aleurodicus dispersus Russell (spiraling whitefly)

Activities of all five species of imported beneficial insects, released during 1979 and 1980, have maintained spiraling whitefly populations at low levels in most localities of the State. Four of the five species were known previously to be established in Hawaii but the fifth species, an aphelinid, *Encarsia* sp., was not recovered until early 1983. It subsequently has been found to be well established on the islands of Oahu and Hawaii. Periodic population increases of *A. dispersus* occurred on favored host plants in some areas of the State during summer months but infestations were suppressed by the redistribution of natural enemies from low *A. dispersus* density localities to problem areas.

Aleurothrixus floccosus (Maskell) (woolly whitefly)

The wooly whitefly was discovered on the island of Hawaii in February 1983, on Maui in March 1983 and on Kauai in April 1983. It was known to occur previously only on the islands of Oahu, Molokai and Lanai. An undescribed species of *Eretmocerus* (Aphelinidae), first observed on Oahu in 1982, provided excellent biological control of the woolly whitefly on all islands during 1983 and 1984. The platygasterid, *Amitis ?spiniferus* (Brethes) and an aphelinid, *Cales noacki* De Santis, both species known to be established only on Oahu, contributed in reducing *A. floccosus* infestations on that island.

Carpophilus humeralis (F.) and *C. hemipterus* (L.) (pineapple souring beetles)

Many thousand insectary bred adults of an encyrtid, *Zeteticontus utilis* Noyes, introduced to aid in the control of pineapple souring beetles, were liberated on Maui and Lanai since August 1981. After only a few isolated recoveries of *Z. utilis* in pineapple fields in late 1982, significant recoveries were made in 1984 indicating establishment of this parasitoid on Maui and Lanai. Propagation of *Z. utilis* is being maintained at both the Maui and Oahu insectaries. Production output is being used to supplement field established *Z. utilis* populations on both islands.

Liriomyza spp. (leafminers)

Six species of leafminer parasitoids were mass propagated in the Oahu insectary and liberated in farm areas throughout the State during 1983 and 1984. Of these 6 species, *Chrysocharis parksi* Crawford, *Opius dissitus* Muesebeck and *Halticoptera patellana* Walker are long established leafminer parasitoids; *Chrysonotomyia puncti-*

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TABLE 1. Introduction and Liberation of Beneficial Organisms in Hawaii: 1983 and 1984.

Pest	Organism Introduced	Source	Sender	Date of Initial Release	No. Released 1983-1984	Release Site
Carpophilus hemipterus (L.) & *C. humeralis* (F.) (pineapple souring beetle)	***Zeteticontus utilis* Noyes (Hymenoptera: Encyrtidae)	East London, South Africa	R. Heu & G. Petty	July 1983	112,000	Maui, Lanai
Plutella xylostella (L.) (diamondback moth)	***Cotesia (=Apanteles) plutellae* (Kurdjumov) (Hymenoptera: Braconidae)	Taiwan Agr. Res. Institute	S.C. Wan	February 1983	152,000	Oahu, Maui
	**Diadromus (=Thyraeella) collaris* (Gravenhorst) (Hymenoptera: Ichneumonidae)	CIBC, Rawalpindi, Pakistan	A.I. Mohyuddin	September 1983	33,000	Oahu
	***Trichogramma chilonis* Ishii (Hymenoptera: Trichogrammatidae)	Taichung, Taiwan	P.Y. Lai	July 1984	20	Oahu
Tetranychus cinnabarinus (Boisduval) (carmine spider mite)	***Typhlodromus occidentalis* Nesbitt (Parasitiformes: Phytoseiidae)	Univ. Calif., Berkeley	M. Hoy	September 1983	6,000	Oahu

*Reintroduction of species previously introduced and released but not found to be established.
**Reintroduction of established species.

ventris (Crawford) and *Ganaspidium hunteri* (Crawford) (=*Cothonaspis* n. sp.)[1] are recently established parasitoids; and *Chysocharis ?giraulti* Yoshimoto is not yet known to be established. Following a reduction of insecticide applications by growers, good leafminer control by established parasitoids was achieved in tomato and cucumber fields in Kau, Kona and Kalopa on Hawaii; in watermelon fields at Kahuku on Oahu and in tomato fields in Omaopio and Pulehu on Maui.

Plutella xylostella (L.) (diamondback moth)

Two shipments of *Cotesia (=Apanteles) plutellae* (Kurdjumov) were received through the courtesy of Ms. Sally C. Wan, Taiwan Agricultural Research Institute. *C. plutellae* was mass propagated in the Maui and Oahu insectaries and liberated in cabbage and watercress growing areas of Oahu and Maui. The Taiwan *C. plutellae* quickly became established in many release sites on both islands. Evaluation surveys are being conducted to determine its effectiveness in controlling the diamondback moth.

Tetranychus cinnabarinus (Boisduval) (carmine spider mite)

Although *Typhlodromus occidentalis* Nesbitt is established in Hawaii, an insecticide resistant strain of this species was imported through the courtesy of Dr. M. Hoy of the University of California at Berkeley, propagated in the Oahu insectary, and released in vegetable farms on Oahu. Two other spider mite predators, *Amblyseius californicus* (McGregor) and *Scolothrips sexmaculatus* (Pergande) also were propagated in the Oahu insectary and liberated in farm localities on Maui, Hawaii and Oahu but their establishment has not yet been achieved.

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[1]J.W. Beardsley (1985), Proc. Hawaii. Entomol. Soc. 26:(in press) determined this parasitoid as *G. hunteri* (Crawford).